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**FEB 22 2008**

Serial No. 10/026,160

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Appl. No. : 10/027,160  
Applicant(s) : Kurt Estes, et al.  
Filed : December 20, 2001  
T.C./A.U. : 1751  
Examiner : Gregory E. Webb  
Docket No. : US19984054-3

I hereby certify that this correspondence is being mailed to the U. S. Patent and Trademark Office, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date indicated below.

Name : Eilcen T. Mathews

Signature: Eilcen T Mathews

Date : February 22, 2008

**Declaration Under 37 CFR 1.131**

Sir:

I the named co-inventor hereby declare as follows:

1. I am a named co-inventor of the subject matter that is claimed and for which a patent is sought on the invention as above mentioned. This application was filed on December 20, 2001. This application is a divisional of application serial no. 09/520,653, filed on March 7, 2000, which is a divisional of 09/038,054, filed on March 11, 1998, which claim the benefit of the earlier filing date of provisional patent application 60/045,072 filed on April 29, 1997. I have reviewed the subject matter of provisional application 60/045,072 and can attest that the subject matter of the Applicants' independent claims are supported by the application. As such, the pending application serial no. 10/027,160 has an earliest effective filing date of April 29, 1997.

2. In the Office Action dated August 22, 2007, the United States Patent and Trademark Office (USPTO) rejected claims 79-81, 83-87 and 89 under section 103(a) as being unpatentable over by Flynn et al., US Patent No. 5,962,390, filed on May 17, 1996 and issued on October 5, 1999, which is a continuation-in-part of application serial no. 08/573,416 filed on December 15, 1995, and which claims the benefit of application no. 08/375,812, filed on January 20, 1995, now abandoned, (hereinafter "Flynn et al."), and in view of each of the secondary references, Smith, et al. (US 5,238,587), Mizutani, et al. (US 4,102,824) and Broze, et al. (US 4,786,431).

3. Claims 79-81, 83-88 and 89 of Application Serial No. 10/027,160 which have a priority date of April 29, 1997 are not obvious over Flynn et al., in view of the secondary references.

Serial No. 10/026,160

4. Per applicable U.S. patent law, Flynn et al. 5,962,390 has an effective 102(e) date of May 17, 1996 (the filing date).

5. This written document is a declaration of prior invention to overcome the cited patent of Flynn et al. 5,962,390. I, an Inventor of the subject matter of the rejected claims, hereby submit this declaration to overcome this reference. I performed certain acts described below.

**I. Showing of Facts Through Document Evidence**

6. Below are facts that show a conception of the invention on or before the May 17, 1996 filing date of Flynn et al. 5,962,390 coupled with due diligence from such conception to a subsequent actual reduction to practice or to the provisional application filing date of 29 April 1997.

7. Exhibit A and Exhibit B were previously submitted in a Declaration I executed on April 26, 2007 and filed on May 29, 2007 along with a Response to Office Action dated January 26, 2007. Exhibits C, D, E, F, and G are submitted herewith and were created to summarize a brainstorming session prior to May 17, 1996. Exhibit H is evidence of the Exhibits stored in the "Whirlpool Information Network" showing the dates these documents were inputted into the network. Exhibit I is also submitted herewith and is a report dated August 15, 1996 of a laboratory study for research which was initiated prior to May 17, 1996.

8. Exhibit H shows the digitized records saved on the Whirlpool Information Network. The information is controlled digitized evidence which is password protected for read-only access. The "Date Composed" is the dates the specific documents were saved in the network following the brainstorming session. Exhibit H shows that the dates Exhibits C, D, E, F and G were saved to the network were on March 1, 1996, March 7, 1996 and May 6, 1996 and prior to May 17, 1996.

9. Exhibit I is a Report 517720-005 entitled "Deterasive Properties of Hydrocarbons, Fluorocarbons and Microemulsions" of a study which determined the deterative properties of various compounds such as alcohols, carboxylic acids, esters, fluorocarbons, ketones, and terpenes. The report of Exhibit I discusses the background concerns of dry cleaning compounds that were traditionally used as well as the test set-up, fabric washing methods and results. Several fabric types were laundered in a simulated washing machine, a tergotometer and tested for reactivity with the various fabrics.

Serial No. 10/026,160

**A. Facts establishing conception**

10. In general, the facts of Exhibits C, D, E, F, G, H and I are hereby incorporated by reference. Moreover, I present the following facts to establish a conception of the invention before the May 17, 1996 Flynn et al. filing date.

**(i) Conception**

11. The basic inventive concept of the application is the fluid composition used in non-aqueous laundering.

12. The USPTO presents Flynn et al. as teaching a variety of solvents suitable for dry cleaning applications which also meets the properties required of Applicants' working fluid. However, as explained in the contemporaneously filed Response to Final Office Action dated August 22, 2007, Flynn et al. do not disclose a wash liquor for laundering a fabric load in an automatic laundering apparatus. Flynn et al. is directed to cleaning substrates, primarily metal and does not teach wash liquor compositions for cleaning fabric loads. Flynn et al. do not disclose a bulk fluid that is inert and having the properties as claimed in combination with additives such as fragrances.

13. The details of previously submitted Exhibit A and contemporaneously submitted Exhibits C, D, E, F, G and H support conception of the claimed invention and show "Project Hope" encompasses non-aqueous working fluid chemistries. Thus, the scope of this declaration is commensurate with the scope of the claimed subject matter.

14. Particularly, Exhibit C shows the Domain of Fabric Laundering through discussion ideas concerning bulk fluid "Chemistry", "Machine Characteristics and Structure" and "Cycles/Processes". The Venn Diagram shows that Project Hope was concerned with researching non-reactive, inert bulk fluids which included fluoroinerts, FI, and yet possessed properties were outside the domain or "space" of the traditional bulk fluids, namely, water, perc, and carbon dioxide which were "reactive" bulk cleaning fluids possessing relatively high Kauri-Butanol values for cleaning ability. We conceived a wash liquor for cleaning a load of fabric in an automatic laundering apparatus, for example a home laundering unit, and that such cleaning can be accomplished through mechanical cleaning where the "bulk" of the wash liquor is inert and substantially less portion of the wash liquor is additives. We conceived and determined that it would not be required that bulk dry-cleaning fluids of the wash liquor possess the reactive properties of chemicals known to be used in dry cleaning at that time. Fluoroinerts have a Kauri-Butanol value less than 30 and are relatively non-reactive to known bulk fluids of dry-cleaning wash liquors. The perc compounds replaced earlier low flash point hydrocarbons for non-aqueous dry-cleaning and this is well documented in dry-cleaning literature. Although some of the hydrocarbon compounds were considered "non-reactive" and having relatively low KB values, these "oleophilic" compounds which were already replaced by perc we conceived of "non-oleophilic" compounds. Therefore the desired "non-aqueous", "apolar" bulk dry-cleaning fluids were to be inert or "non-reactive" to several fabrics and also compatible with additives such as oxygen bleach, detergents which include fragrance, co-solvents, enzymes, etc. Such bulk fluid chemistries were considered in conjunction with in-home washing machine equipment and

Serial No. 10/026.160

various wash cycles and processes as indicated by the topic headings of Exhibit C and which were discussed in the brainstorming session of Project Hope.

15. Exhibit D lists the characteristics of fluoroinerts which were relevant in developing testing protocol.

16. Exhibit E lists the potential property characteristics (i.e. "FuFu") of the desired "non-aqueous", "non-reactive", "non-oleophilic" and "apolar" working fluids for use in a laundering method in an automatic laundering apparatus. Exhibit F shows that the desired inert working fluid is defined as "does no cleaning" and "fabric stability" which was outside the scope of the known compounds for wash liquors which cleaned fabric loads at the time.

17. The previously filed Exhibits A and B pertaining to Project Hope also illustrates desired characteristics of the inert working fluid chemistries and the various characteristics of an exemplary non-aqueous working fluid and that hundreds of compounds were selected for further testing and that several were currently being bench tested. Exhibit B listed some of the testing protocols.

18. Exhibit G is a table of several compounds which were evaluated. Exhibit H shows the document of Exhibit G is entitled "Updated Non-Aqueous Matrix" which was composed (i.e. entered into the network) on May 6, 1996.

**(ii) Effective date of Flynn et al.**

19. As indicated on the face of the Flynn et al. patent, issued on October 5, 1999, and has a section 102(c) date (filing date) of May 17, 1996. Accordingly, the date to overcome is May 17, 1996.

**(iii) On or before the effective date of Flynn et al.**

20. I allege that the acts relied upon to establish the date on or before May 17, 1996. The testing and the exhibits attached were generated prior to the effective date of Flynn et al.

**B. Facts establishing reduction to practice**

21. In general, the facts of Exhibits C, D, E, F and G are hereby incorporated by reference. Moreover, I present the following facts to establish a reduction to practice.

Serial No. 10/026,160

(i) Actual reduction to practice

22. After conception of the invention on or before May 17, 1996, I tested or had the invention tested to establish its capacity to successfully perform its intended purpose. Previously filed Exhibit B represents an invention testing protocol/assessment that discusses the experiments that would be run during a period starting before May 17, 1996 and into later parts of 1996. Contemporaneously submitted Exhibit I explain the background, testing methods and results of several non-aqueous inert fluids which could be used for laundering fabrics in an automatic laundering apparatus.

23. Previously filed Exhibit A and contemporaneously filed Exhibits C, D, E, F, G and H show information generated and dated prior to May 17, 1996 that show the many chemicals that were currently used in the industry and which were not subject of the desired compounds of the invention, and also, that of the many chemicals that exhibited some of the desired characteristics, several were chosen as candidates. Several candidates were benchtop tested.

(ii) Constructive reduction to practice

24. I allege that the present application for a U.S. patent recites independent claims of the same invention disclosed in the provisional application filed on April 29, 1997.

25. Therefore, constructive reduction to practice was achieved on April 29, 1997.

C. Facts establishing reasonable diligence

26. I present the following facts to establish that there was reasonable diligence from before the May 17, 1996 effective date of Flynn et al. to the actual reduction to practice of the invention or alternatively to the provisional filing date.

27. As noted above, conception occurred on or before the May 17, 1996 filing date of Flynn et al. Moreover, actual reduction to practice occurred on or before April 29, 1997. I assert that there was reasonable diligence from conception to reduction to practice, either actual or constructive. Exhibits C, D, E, F and G indicate that several inert working fluids were outside the scope of known reactive dry-cleaning fluids, and that such inert non-aqueous, non-reactive, non-oleophilic, and apolar working fluids were selected as having desirable characteristics and these chemicals were submitted for further bench testing. The characteristics were counter-intuitive of the characteristics of known dry-cleaning wash liquors used on fabric loads in an automated laundering apparatus. As Exhibits C, D, E, F, G, H and I show, I was cognizant of the need to pursue patent applications to protect the invention. The inventors timely filed a provisional patent application on April 29, 1997. The selection of chemicals, the experiments, conducted throughout 1996 and the actual filing of a patent application indicate a reasonable diligence period from on or before the Flynn et al. filing date.

Serial No. 10/026,160

28. Alternatively, the time period taken for the completion of the application constitutes reasonable diligence. During this time period, I and/or our representative worked reasonably hard and expeditiously to prepare, execute and file a patent application in the United States Patent Office. Accordingly, there was reasonable diligence from on or before the Flynn et al. filing date to the filing of the application of the present invention.

## **II. Allegations and other Statements**

29. I allege that the acts relied upon to establish the date on or before Flynn et al. were carried out in the United States.

## **III. Signature and Declaration in Lieu of Oath Under 37 CFR 1.68**

30. I hereby declare that the statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I acknowledge that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. 1001) and may jeopardize the validity of the application or patent issuing thereon.

  
Tremitchell Wright

Feb. 22, 2008  
Date

**EXHIBIT C**Chemistry

Alternative to FI

Additives

- Oxygen bleach
- Detergents (non-traditional surfactants)
- Enzymes
- Brighteners
- Co-solvents
- 2 Phase cleaning

Solutions -

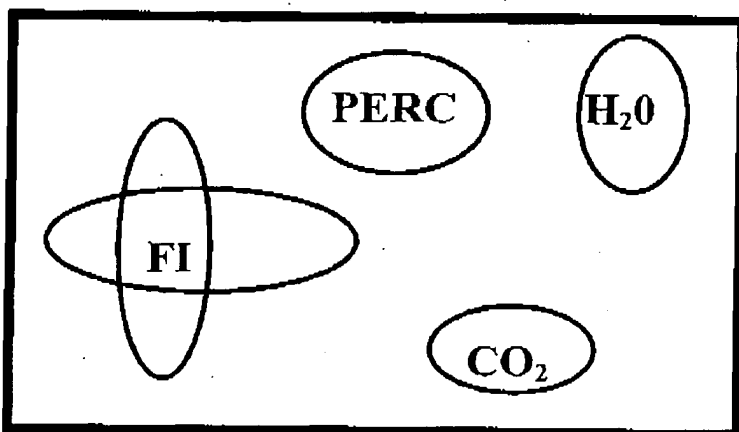
Cq FI and CO

FI and H<sub>2</sub>OMachine Characteristics, Structures

- Recovery
- Ventilation
- Containment
- Mechanical Input
- Dispensing
- Thermal Input
- Geometry of Fabric (hanging, batch vs. continuous drying in bag)
- Footprint

Cycles/Process

- Water followed by FI
- Mist
- Emulsion Wash
- Dry Cycle



**EXHIBIT D**Characteristics

<b>KNOWN</b>	<b>UNKNOWN</b>
FI not available at commercial prices	Fiber damage unknown
Displacement of H <sub>2</sub> O	Dye transfer unknown -
Low vapor pressure - need to avoid leaks	Quality of "grade" needed unknown
Osmotic gradients	Variability of molecule size effects drying rate, surface tension rate, surface tension
Low viscosity speeds penetration of fabric	Dielectric characteristics might reduce static or also allow control charge density of contaminants or can the charge surfactants
Broad range of FI's available	Unknown FI reactivity with additives
Cavitation in pumps	Solvency of particular soils unknown
FI is considered environmentally safe, non-toxic	FI non-polar might limit shrinkage of wool
pH neutral	Sanitization effect unknown
FI's have a wide range of vapor pressures - allows flexibility of heating characteristics	
FI absorbs oxygen so may facilitate oxy bleaches.	
Sensors for leaks exists.	
FI is easily recyclable and disposable (except reactivity unknown)	




**EXHIBIT E**Potential FuFu Charectoristics

- Low surface tension less than 1/2 of H<sub>2</sub>O with detergent (15 dynes /cm<sup>2</sup>) at STP (or at operating condition)
- Viscosity < H<sub>2</sub>O [1 N/M]
- Minimum solubility in water (<10%)
- Density different by more than  $\pm 10\%$  from H<sub>2</sub>O (at operating condition)
- pH Neutral [6.5 - 7.5]
- Non-reactive with bleach? (Highly non-reactive)
- Minimal solvency of oil soil
- Carries enzymes and bleach without restricting their activity (redox potential >y) (enzyme 1/2 life >y)
- low vapor pressure > 7 1/2 at m.

## EXHIBIT F

Project  
HOPEMeeting Notes for  
Non Aqueous Development Needs

- 
- 
- 4 For initial patent work go with FI technology
  - └ Make a mixture .... (Solution will be multi-component
  - └ Decision Matrix for Evaluation
    - Define IWF
    - Co-Solvent or Detergent for IWF

## 4 We define inert as:

- Does no cleaning
- Fabric Stability

└ The greatest Area of Concern/Potential is the  
recovery/rinse, separation, disposal.

- ex. Rynex is misible with H2O so old gravity PERC cleaner is not usable!

PROPERTIES **EXHIBIT C**

CLASSIFICATION	COMPOUND	INDUSTRIAL USE	WATER SOLUBILITY (GR / 100 GR WATER)	TOXICOLOGY / HAZARDS	SURFACE TENSION	VAPOR PRESSURE (mm)	VAPOR DENSITY	SOLVENCY	REACTIVITY	VISCOSITY	BOILING POINT (°C)	DENSITY @ 20°C	FLASH-POINT (°C)
ALCOHOLS	1,1,1,3,3,3-HEXAFLUORO-2-PROPANO-			COMBUSTIBLE									
	1,6-HEPTADIEN-4-OL												
	1-CYCLOHEXYLETHANOL												
	1-OCTADECANOL	Emulsifiers, Antifoams	INSOL.	IRRITANT									
	1-TETRADECANOL	Perfumes	INSOL.	COMB. IRRITANT									
	1-UNDECANOL	NETTING AGENT IN TEXTILE	INSOL.	IRRITANT									
	2,3-DIMETHYL-2-BUTANOL		2.44	IRRITANT									
	2,4,4-TRIMETHYL-1-PROPANOL		3.50	COMBUSTIBLE									
	2,4-DIMETHYL-2,4-PENTANEDIOL			NA									
	2,6-DIMETHYL-4-HEPTANOL			COMBUSTIBLE									
	2,6-DIMETHYLCYCLOHEXANOL			COMBUSTIBLE									
	2-BUTENE-1,4-DIOL		6.00	IRRITANT									
	2-DECANOL	SOLVENTS, SURFACTANTS	INSOL.	IRRITANT									
	2-ETHOXYPHENOL	WETTING AGENT, ANTISTAT	INSOL.	IRRITANT									
	2-ETHYL-1-HEXANOL	WETTING AGENT FOR DYES	72.00	IRRITANT									
	2-METHYL-1-BUTANOL	OILS	3.63	COMB. IRRITANT									
	2-METHYL-2-HEXANOL	SOAPS	0.10	COMBUSTIBLE									
	2-METHYL-3-HEXANOL			COMBUSTIBLE									
	2-METHYL-3-PENTANOL			COMBUSTIBLE									
	2-METHYLCYCLOPENTANOL			COMBUSTIBLE									
	2-METHYLPHENETHYL ALCOHOL	OILS	INSOL.	COMBUSTIBLE									
	2-NONANOL	OILS	INSOL.	IRRITANT									
	2-OCTANOL	DISINFECTING SOAPS	0.10	COMBUSTIBLE									
	3,4-DIMETHYLCYCLOHEXANOL			COMBUSTIBLE									
	3,5,5-TRIMETHYL-1-HEXANOL			IRRITANT									
	3,7-DIMETHYL-1-OCTANOL			COMBUSTIBLE									
	3-CYCLOHEXYL-1-PROPANOL			COMBUSTIBLE									
	3-CYCLOPENTYL-1-PROPANOL			COMBUSTIBLE									
	3-ETHYL-3-PENTANOL			COMBUSTIBLE									
	3-HEXEN-1-OL			COMBUSTIBLE									
	3-METHYL-3-PENTANOL			COMBUSTIBLE									
	3-METHYL-2-BUTENE-1-OL			IRRITANT									
	3-METHYL-2-PENTANOL			COMBUSTIBLE									
	3-METHYL-3-PENTANOL			COMBUSTIBLE									
	3-NONEN-1-OL	PHARMACEUTICALS	1.00	COMB. IRRITANT									
	3-OCTANOL			COMBUSTIBLE									
	3-PENTANOL	SOLVENTS	5.50	COMB. IRRITANT									
	4-CYCLOHEXYL-1-BUTANOL			COMBUSTIBLE									
	4-HEXEN-1-OL			COMBUSTIBLE									
	4-METHYL-1-PENTANOL			COMBUSTIBLE									
	4-METHYL-2-PENTANOL			COMBUSTIBLE									
	4-METHYL-3-HEPTANOL			COMB. IRRITANT									
	4-METHYL-3-PENTEN-1-OL			COMBUSTIBLE									
	4-METHYLPHENETHYL ALCOHOL			COMBUSTIBLE									
	5-HEXEN-1-OL			COMBUSTIBLE									
	5-METHYL-2-HEXANOL			COMBUSTIBLE									
	6-METHYL-2-HEPTANOL			COMBUSTIBLE									
	6-METHYL-5-HEPTEN-2-OL			COMBUSTIBLE									
	CYCLOBUTANOL			COMBUSTIBLE									
	CYCLOHEPTANEMETHANOL			COMBUSTIBLE									
	CYCLOOCTANOL			COMBUSTIBLE									

## PROPERTIES

CLASSIFICATION	COMPOUND	INDUSTRIAL USE	WATER SOLUBILITY (GR / 100 GR WATER)	TOXICOLOGY / HAZARDOUS	SURFACE TENSION	VAPOR PRESSURE (mm Hg)	VAPOR DENSITY	SOLVENCY REACTIVITY	VISCOSITY (cP)	BOILING POINT (°C)	DENSITY @ 20 °C	FLASH-POINT (°C)
	iso-PENTYL	MFG ARTIFICIAL SILK	2.00	HAZARDOUS								
	iso-BUTYL	MFG FRUIT FLAVORS	10.00	HAZARDOUS								
	1-FLUOROMETHYL BENZYL A-COMOL											
	n-BUTYL	MFG OF DETERGENTS	7.90	HAZARDOUS								
	n-HEPTYL	PERFUMES	0.20	HAZARDOUS								
	n-HEXYL	MFG OF ANTISEPTICS	0.60	HAZARDOUS								
	n-OCYL	PERFUMES	0.05	HAZARDOUS								
	n-PENTYL	SOLVENT	2.30	HAZARDOUS								
	NONOXNOL	WETTING AGENTS	11.30	HAZARDOUS								
	38-BUTYL	YNTH OF WETTING AGENT	12.50	HAZARDOUS								
	TERPENE-4-OL	DENATURE FATS FOR SOAP	INSOL.	HAZARDOUS								
	iso-PENTYL		12.50	HAZARDOUS								
	24-NONADIENAL											
	2-ETHYLHEXANAL											
	2-METHYLUNDECANAL											
	2-NONENAL	FLAVORING AGENT										
	2-PHENYLPROPIONALDEHYDE											
	3-METHYL-2-BUTENAL	FLAVORS: PERFUMES	10.00	HAZARDOUS								
	BENZALDEHYDE	MFG OF DYES	0.30	HAZARDOUS								
	CAPRALDEHYDE	POLYMERIZATION	0.05	HAZARDOUS								
	CYCLOOCTANECARBOXALDEHYDE											
	HEPTALDEHYDE	SYNTHESIS OF CAPROS	0.10	HAZARDOUS								
	ISOBUTYRALDEHYDE	SYNTHESIS OF CELLULOSE	11.30	HAZARDOUS								
	ETHYLALDEHYDE	EPARATION OF ALDEHYDE	0.42	HAZARDOUS								
	MEHTHONE	MFG RESINS	7.00	HAZARDOUS								
	n-BUTYRALDEHYDE	FLAVORING CAPRO	0.05	HAZARDOUS								
	p-VALERALDEHYDE											
	NONYL ALDEHYDE	SYNTHESIS OF CAPROS	0.05	HAZARDOUS								
	PHENYLACETALDEHYDE		16.00	HAZARDOUS								
	PROPIONALDEHYDE											
	TETRADECYL ALDEHYDE											
	TRIDECANAL											
	1-DIMETHYLCYCLOHEXANE											
	1,2-DIMETHYLCYCLOHEXANE											
	BUTYLCYCLOHEXANE											
	CYCLODECANE											
	CYCLODODECANE											
	CYCLOHEPTANE	LACQUERS / RESINS	INSOL.	HAZARDOUS								
	CYCLOHEXANE	PAINT REMOVERS	INSOL.	HAZARDOUS								
	CYCLOPENTANE	MFG RESINS	INSOL.	HAZARDOUS								
	CYCLOPENTENE											
	METHYLCYCLOHEXANE	ALKYLATION CMPO	INSOL.	HAZARDOUS								
	METHYLCYCLOPENTANE	PERFUMES	INSOL.	HAZARDOUS								
	2,2,4,6,8-HEPTAMETHYLNONANE											
	CYCLOCOCTANE											
	DECANE											
	DODECANE											
	DODECANE											
	ETHYLCYCLOPENTANE											
	HEPTADECANE											
	HEPTANE	FUELS	INSOL.	HAZARDOUS								
	HEXANE	SYNTHESIS	INSOL.	HAZARDOUS								

## PROPERTIES

CLASSIFICATION	COMPOUND	INDUSTRIAL USE	WATER SOLUBILITY ES (GR / 100 GR WATER)	TOXICOLOGY / HAZARDS	SURFACE TENSION	VAPOR PRESSURE E (mm)	VAPOR DENSITY	SOLVENCY	REACTIVITY	VISCOSITY	BOILING POINT (°C)	DENSITY (@ 20 °C)	FLASH- POINT (°C)
ALKENES	ISOCHEXANE	THINNERS	INSOL	FLAMMABLE	10	10	2		OXIDIZERS		60.0	0.654	-12
	ISOPENTANE		INSOL	IRRITANT	24	24	2		STABLE		28.9	0.610	21
	METHYLPENTANE		INSOL	FLAMMABLE	28	28	3		OXIDIZERS		0.33	0.610	-12
	NEOPENTANE		INSOL	IRRITANT	41	41	2		OXIDIZERS		85.3	0.673	4
	NONADECANE		INSOL	NA	10	10	2		OXIDIZERS		159.2	0.785	158
	NONANE	EMULSIONS, TEXTILE C/L	INSOL	IRRITANT	10	10	2		OXIDIZERS		15.3	0.718	31
	OCTADECANE	FUELS	INSOL	IRRITANT	11	11	2		OXIDIZERS		317.2	0.771	-155
	OCTANE	FUELS, SYNTHESIS	INSOL	IRRITANT	11	11	2		OXIDIZERS		178.0	0.703	15
	PENTANE	WETTING AGENT	INSOL	IRRITANT	10	10	2		OXIDIZERS		36.1	0.626	13
	TRIDECADECANE		INSOL	IRRITANT	10	10	2		OXIDIZERS		232.0	0.702	99
ALKYNES	1-DECENE			IRRITANT	9.4	9.4	2		OXIDIZERS		234.0	0.706	79
	1-HEPTADECENE			IRRITANT	9.4	9.4	2		OXIDIZERS		186.0	0.740	58
	1-HEPTENE			IRRITANT	101	101	3		OXIDIZERS		171.0	0.723	169
	1-HEXADECENE			IRRITANT	92	92	3		OXIDIZERS		167.0	0.745	169
	1-HEXENE			FLAMMABLE	135	135	3		OXIDIZERS		274.0	0.740	132
	1-UNDECENE			CONSUMPTIBLE	11	11	2		OXIDIZERS		69.6	0.676	-7
	1-OCTADECENE			FLAMMABLE	35	35	3		OXIDIZERS		140.0	0.730	45
	1-OCTENE			FLAMMABLE	35	35	3		OXIDIZERS		173.0	0.740	145
	1-PENTADECENE			FLAMMABLE	161	161	2		OXIDIZERS		213.0	0.718	21
	1-PTERENE			FLAMMABLE	161	161	2		OXIDIZERS		265.0	0.716	105
ALKYNES	2,3-DIMETHYL-2-BUTENE			FLAMMABLE	161	161	2		OXIDIZERS		32.0	0.640	8
	2-BENZYL-5-NORCORNENE			FLAMMABLE	161	161	2		OXIDIZERS		251.0	0.716	115
	2-METHYL-1-UNDECENE			FLAMMABLE	161	161	2		OXIDIZERS		220.0	0.700	72
	2-METHYL-2-BUTENE			FLAMMABLE	161	161	2		OXIDIZERS		107.0	0.700	67
	2-NONENE			FLAMMABLE	65	65	2		OXIDIZERS		71.0	0.706	105
	2-PENTENE			FLAMMABLE	65	65	2		OXIDIZERS		303.0	0.707	77
	3-NONENE			FLAMMABLE	11.6	11.6	3		OXIDIZERS		290.0	0.740	32
	4-NONENE			FLAMMABLE	11.6	11.6	3		OXIDIZERS		144.0	0.714	32
	7-TETRADECENE			FLAMMABLE	11.6	11.6	3		OXIDIZERS		370.0	0.665	9
	8-TETRADECENE			FLAMMABLE	11.6	11.6	3		OXIDIZERS		139.0	0.724	22
ALKYNES	1-TERPINENE			FLAMMABLE	0.7	0.7	4		OXIDIZERS		140.0	0.712	77
	CYCLOOCTENE			FLAMMABLE	0.7	0.7	4		OXIDIZERS		250.0	0.784	85
	G-TERPINENE			FLAMMABLE	0.7	0.7	4		OXIDIZERS		120.0	0.637	45
	KEROSENE			FLAMMABLE	0.23	0.23	4		OXIDIZERS		180.0	0.689	81
	1-DODECYNE			FLAMMABLE	0.23	0.23	4		OXIDIZERS		215.0	0.773	70
	1-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS		177.0	0.897	72
	DIETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS		174.0	0.920	62
	PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	STEARAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	1-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
AMIDES	1,3-CYCLOPENTADIENE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
AMINES	1,3-CYCLOPENTADIENE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
CARBOXYLIC AC	1,3-CYCLOPENTADIENE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				
	2-ETHYL-PROPIONAMIDE			FLAMMABLE	0.23	0.23	4		OXIDIZERS				

## PROPERTIES

CLASSIFICATION	COMPOUND	INDUSTRIAL USE	WATER SOLUBILITY 100 GR WATER	TOXICOLOGY / HAZARDS	SURFACE TENSION	VAPOR PRESSURE E (mm)	VAPOR DENSITY	SOLVENCY	REACTIVITY	VISCOSITY	BOILING POINT (°C)	DENSITY (@ 20 °C)	FLASH-POINT (°C)
	DIMETHYL SUCCINATE		INSOL	IRRITANT			8	ACID, BASE, OXID			217.7	1.047	59
	DIMETHYL 3-HYDROXYGLUTARATE			NA				OXIDIZERS			139.0	1.192	109
	DIMETHYL 3-METHYLGLOUTARATE			NA				ACIDS, BASE, OXID			139.0	1.095	97
	DIMETHYL MALONATE			IRRITANT				ACIDS, BASE, OXID			139.0	1.158	97
	DIMETHYL METHYLSUCCINATE			COMBUSTIBLE				ACIDS, BASE, OXID			139.0	1.078	93
	ETHYL CAPRYLATE			IRRITANT				ACIDS, BASE, OXID			245.0	0.862	102
	ETHYL PENTAFLUOROPROPIONATE			IRR: COMB		0.2		ACIDS, BASE, OXID			235.0	0.878	74
	ETHYL UNDECYLENATE			IRR: FLAM				OXIDIZERS			75.3	1.299	1
	1,1-DITETRADECADIENE			NA				OXIDIZERS			253.0	0.878	109
	1,3-CYCLOHEXADIENE			HARMFUL		0.8		OXIDIZERS			131.0	0.848	103
	1,3-CYCLOPENTADIENE					9.75		OXIDIZERS			63.2	0.810	46
	1,4-CYCLOHEXADIENE					0.7		OXIDIZERS			46.0	0.774	26
	1,5-CYCLOHEXADIENE					4.7		OXIDIZERS			66.5	0.840	51
	1,5-CYCLOOCTADIENE			IRRITANT		25.0		OXIDIZERS			69.0	0.878	74
	1,5-DIMETHYL-1,5-CYCLOOCTADIENE			IRRITANT				OXIDIZERS			150.3	0.882	31
	1,8-DIADENE			IRRITANT				OXIDIZERS			74.0	0.867	55
	1,9-DECADIENE			IRRITANT				OXIDIZERS			141.2	0.740	25
	METHYL HEPTAFLUOROBUTYRATE			IRRITANT				OXIDIZERS			169.0	0.750	41
	4-DIBASIC ESTER			IRRITANT				OXIDIZERS			81.0	1.072	109
	5-DIBASIC ESTER			COMBUSTIBLE		0.3		ACID, BASE, OXID			200.0	1.117	84
	DIETHYL ESTER			PHALANT		7.97		ACID, BASE, OXID			93.0	1.387	107
	ETHYL CAPROATE			COMB, IRR		1		OXIDIZERS			259.0	1.116	156
	ETHYL FORMATE			FLAMMABLE		56		OXIDIZERS			168.0	0.823	48
	ETHYL UNDECANOATE			NA				OXIDIZERS			52.0	0.817	10
	METHYL 2-TRIMETHYLSILYL-2-HEPTANOATE			COMBUSTIBLE				OXIDIZERS			165.0	0.959	105
	METHYL 2-IONYNOATE			COMBUSTIBLE				OXIDIZERS			78.0	0.893	89
	METHYL CAPRYLATE			COMBUSTIBLE				OXIDIZERS			121.0	0.915	109
	METHYL CAPRYLATE			COMBUSTIBLE				OXIDIZERS			131.0	0.905	44
	METHYL CYCLOHEXYLACETATE			COMBUSTIBLE				ACID, BASE, OXID			194.0	0.977	72
	METHYL DECANOATE			COMBUSTIBLE				ACID, BASE, OXID			201.0	0.991	74
	METHYL DECANOATE			COMBUSTIBLE				OXIDIZERS			108.0	0.873	94
	METHYL DODECANOATE			COMBUSTIBLE				OXIDIZERS			213.0	0.875	84
	METHYL PHENOXYACETATE			NA				OXIDIZERS			243.0	1.148	109
	METHYL TRIDECANOATE			NA				OXIDIZERS			231.0	0.894	109
	METHYL UNDECANOATE			NA				OXIDIZERS			134.0	0.872	109
	2,2,2-TRIFLUOROETHYL ETHER			FLAMMABLE				OXIDIZERS			62.0	1.406	5
	2-HYDROXYETHYL ETHER			HARMFUL		0.01		OXIDIZERS			245.0	1.119	143
	ALLYL PHENYL ETHER			HARMFUL				OXIDIZERS			192.0	0.978	62
	ANISOLE			COMBUSTIBLE		10		OXIDIZERS			154.0	0.995	91
	DI (ETHYL) ETHYLENE GLYCOL DIETHYL ETHER			HARMFUL		0.5		OXIDIZERS			160.0	0.909	71
	ETHYL HEPTANOATE			IRRITANT				OXIDIZERS			188.0	0.958	96
	ETHYL PHENYL ETHER			COMBUSTIBLE				OXIDIZERS			170.0	0.968	57
	HEXAFLUORO DIETHYL ETHER		INSOL	IRR: COMB				OXIDIZERS			51.9	1.410	NOIE
	HEXYL ETHER			FLAMMABLE		120		OXIDIZERS			238.0	0.709	78
	ISOPROPYL ETHER			COMBUSTIBLE				OXIDIZERS			68.0	0.725	12
	PENTYL ETHER			COMBUSTIBLE				OXIDIZERS			187.0	0.785	57
	PROPYL ETHER			COMBUSTIBLE				OXIDIZERS			83.0	0.789	12
	1-FLUOROPENTANE			COMBUSTIBLE				OXIDIZERS			47.0	1.273	38
	2,2-DIMETHYL-5,5,7,7,8,8-HEPTAFLUORO-3-OCTANEDIONE			FLAMMABLE				OXIDIZERS			96.0	1.600	24
	2,2,3,3,4,4,5,5,6,6,7,7,8,8-2,2,4,4,6,6,8,8-1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15,17,17,19,19,21,21,23,23,25,25,27,27,29,29,31,31,33,33,35,35,37,37,39,39,41,41,43,43,45,45,47,47,49,49,51,51,53,53,55,55,57,57,59,59,61,61,63,63,65,65,67,67,69,69,71,71,73,73,75,75,77,77,79,79,81,81,83,83,85,85,87,87,89,89,91,91,93,93,95,95,97,97,99,99,101,101,103,103,105,105,107,107,109,109,111,111,113,113,115,115,117,117,119,119,121,121,123,123,125,125,127,127,129,129,131,131,133,133,135,135,137,137,139,139,141,141,143,143,145,145,147,147,149,149,151,151,153,153,155,155,157,157,159,159,161,161,163,163,165,165,167,167,169,169,171,171,173,173,175,175,177,177,179,179,181,181,183,183,185,185,187,187,189,189,191,191,193,193,195,195,197,197,199,199,201,201,203,203,205,205,207,207,209,209,211,211,213,213,215,215,217,217,219,219,221,221,223,223,225,225,227,227,229,229,231,231,233,233,235,235,237,237,239,239,241,241,243,243,245,245,247,247,249,249,251,251,253,253,255,255,257,257,259,259,261,261,263,263,265,265,267,267,269,269,271,271,273,273,275,275,277,277,279,279,281,281,283,283,285,285,287,287,289,289,291,291,293,293,295,295,297,297,299,299,301,301,303,303,305,305,307,307,309,309,311,311,313,313,315,315,317,317,319,319,321,321,323,323,325,325,327,327,329,329,331,331,333,333,335,335,337,337,339,339,341,341,343,343,345,345,347,347,349,349,351,351,353,353,355,355,357,357,359,359,361,361,363,363,365,365,367,367,369,369,371,371,373,373,375,375,377,377,379,379,381,381,383,383,385,385,387,387,389,389,391,391,393,393,395,395,397,397,399,399,401,401,403,403,405,405,407,407,409,409,411,411,413,413,415,415,417,417,419,419,421,421,423,423,425,425,427,427,429,429,431,431,433,433,435,435,437,437,439,439,441,441,443,443,445,445,447,447,449,449,451,451,453,453,455,455,457,457,459,459,461,461,463,463,465,465,467,467,469,469,471,471,473,473,475,475,477,477,479,479,481,481,483,483,485,485,487,487,489,489,491,491,493,493,495,495,497,497,499,499,501,501,503,503,505,505,507,507,509,509,511,511,513,513,515,515,517,517,519,519,521,521,523,523,525,525,527,527,529,529,531,531,533,533,535,535,537,537,539,539,541,541,543,543,545,545,547,547,549,549,551,551,553,553,555,555,557,557,559,559,561,561,563,563,565,565,567,567,569,569,571,571,573,573,575,575,577,577,579,579,581,581,583,583,585,585,587,587,589,589,591,591,593,593,595,595,597,597,599,599,601,601,603,603,605,605,607,607,609,609,611,611,613,613,615,615,617,617,619,619,621,621,623,623,625,625,627,627,629,629,631,631,633,633,635,635,637,637,639,639,641,641,643,643,645,645,647,647,649,649,651,651,653,653,655,655,657,657,659,659,661,661,663,663,665,665,667,667,669,669,671,671,673,673,675,675,677,677,679,679,681,681,683,683,685,685,687,687,689,689,691,691,693,693,695,695,697,697,699,699,701,701,703,703,705,705,707,707,709,709,711,711,713,713,715,715,717,717,719,719,721,721,723,723,725,725,727,727,729,729,731,731,733,733,735,735,737,737,739,739,741,741,743,743,745,745,747,747,749,749,751,751,753,753,755,755,757,757,759,759,761,761,763,763,765,765,767,767,769,769,771,771,773,773,775,775,777,777,779,779,781,781,783,783,785,785,787,787,789,789,791,791,793,793,795,795,797,797,799,799,801,801,803,803,805,805,807,807,809,809,811,811,813,813,815,815,817,817,819,819,821,821,823,823,825,825,827,827,829,829,831,831,833,833,835,835,837,837,839,839,841,841,843,843,845,845,847,847,849,849,851,851,853,853,855,855,857,857,859,859,861,861,863,863,865,865,867,867,869,869,871,871,873,873,875,875,877,877,879,879,881,881,883,883,885,885,887,887,889,889,891,891,893,893,895,895,897,897,899,899,901,901,903,903,905,905,907,907,909,909,911,911,913,913,915,915,917,917,919,919,921,921,923,923,925,925,927,927,929,929,931,931,933,933,935,935,937,937,939,939,941,941,943,943,945,945,947,947,949,949,951,951,953,953,955,955,957,957,959,959,961,961,963,963,965,965,967,967,969,969,971,971,973,973,975,975,977,977,979,979,981,981,983,983,985,985,987,987,989,989,991,991,993,993,995,995,997,997,999,999,1001,1001,1003,1003,1005,1005,1007,1007,1009,1009,1011,1011,1013,1013,1015,1015,1017,1017,1019,1019,1021,1021,1023,1023,1025,1025,1027,1027,1029,1029,1031,1031,1033,1033,1035,1035,1037,1037,1039,1039,1041,1041,1043,1043,1045,1045,1047,1047,1049,1049,1051,1051,1053,1053,1055,1055,1057,1057,1059,1059,1061,1061,1063,1063,1065,1065,1067,1067,1069,1069,1071,1071,1073,1073,1075,1075,1077,1077,1079,1079,1081,1081,1083,1083,1085,1085,1087,1087,1089,1089,1091,1091,1093,1093,1095,1095,1097,1097,1099,1099,1101,1101,1103,1103,1105,1105,1107,1107,1109,1109,1111,1111,1113,1113,1115,1115,1117,1117,1119,1119,1121,1121,1123,1123,1125,1125,1127,1127,1129,1129,1131,1131,1133,1133,1135,1135,1137,1137,1139,1139,1141,1141,1143,1143,1145,1145,1147,1147,1149,1149,1151,1151,1153,1153,1155,1155,1157,1157,1159,1159,1161,1161,1163,1163,1165,1165,1167,1167,1169,1169,1171,1171,1173,1173,1175,1175,1177,1177,1179,1179,1181,1181,1183,1183,1185,1185,1187,1187,1189,1189,1191,1191,1193,1193,1195,1195,1197,1197,1199,1199,1201,1201,1203,1203,1205,1205,1207,1207,1209,1209,1211,1211,1213,1213,1215,1215,1217,1217,1219,1219,1221,1221,1223,1223,1225,1225,1227,1227,1229,1229,1231,1231,1233,1233,1235,1235,1237,1237,1239,1239,1241,1241,1243,1243,1245,1245,1247,1247,1249,1249,1251,1251,1253,1253,1255,1255,1257,1257,1259,1259,1261,1261,1263,1263,1265,1265,1267,1267,1269,1269,1271,1271,1273,1273,1275,1275,1277,1277,1279,1279,1281,1281,1283,1283,1285,1285,1287,1287,1289,1289,1291,1291,1293,1293,1295,1295,1297,1297,1299,1299,1301,1301,1303,1303,1305,1305,1307,1307,1309,1309,1311,1311,1313,1313,1315,1315,1317,1317,1319,1319,1321,1321,1323,1323,1325,1325,1327,1327,1329,1329,1331,1331,1333,1333,1335,1335,1337,1337,1339,1339,1341,1341,1343,1343,1345,1345,1347,1347,1349,1349,1351,1351,1353,1353,1355,1355,1357,1357,1359,1359,1361,1361,1363,1363,1365,1365,1367,1367,1369,1369,1371,1371,1373,1373,1375,1375,1377,1377,1379,1379,1381,1381,1383,1383,1385,1385,1387,1387,1389,1389,1391,1391,1393,1393,1395,1395,1397,1397,1399,1399,1401,1401,1403,1403,1405,1405,1407,1407,1409,1409,1411,1411,1413,1413,1415,1415,1417,1417,1419,1419,1421,1421,1423,1423,1425,1425,1427,1427,1429,1429,1431,1431,1433,1433,1435,1435,1437,1437,1439,1439,1441,1441,1443,1443,1445,1445,1447,1447,1449,1449,1451,1451,1453,1453,1455,1455,1457,1457,1459,1459,1461,1461,1463,1463,1465,1465,1467,1467,1469,1469,1471,1471,1473,1473,1475,1475,1477,1477,1479,1479,1481,1481,1483,1483,1485,1485,1487,1487,1489,1489,1491,1491,1493,1493,1495,1495,1497,1497,1499,1499,1501,1501,1503,1503,1505,1505,1507,1507,1509,1509,1511,1511,1513,1513,1515,1515,1517,1517,1519,1519,1521,1521,1523,1523,1525,1525,1527,1527,1529,1529,1531,1531,1533,1533,1535,1535,1537,1537,1539,1539,1541,1541,1543,1543,1545,1545,1547,1547,1549,1549,1551,1551,1553,1553,1555,1555,1557,1557,1559,1559,1561,1561,1563,1563,1565,1565,1567,1567,1569,1569,1571,1571,1573,1573,1575,1575,1577,1577,1579,1579,1581,1581,1583,1583,1585,1585,1587,1587,1589,1589,1591,1591,1593,1593,1595,1595,1597,1597,1599,1599,1601,1601,1603,1603,1605,1605,1607,1607,1609,1609,1611,1611,1613,1613,1615,1615,1617,1617,1619,1619,1621,1621,1623,1623,1625,1625,1627,1627,1629,1629,1631,1631,1633,1633,1635,1635,1637,1637,1639,1639,1641,1641,1643,1643,1645,1645,1647,1647,1649,1649,1651,1651,1653,1653,1655,1655,1657,1657,1659,1659												

## PROPERTIES

CLASSIFICATION	COMPOUND	INDUSTRIAL USE	WATER SOLUBILITY 100 GR WATER	TOXICOLOGY / HAZARDS	SURFACE TENSION	VAPOR PRESSURE E (mm)	VAPOR DENSITY	SOLVENCY	REACTIVITY	VISCOSITY cP	BOILING POINT (°C)	DENSITY @ 20 °C	FLASH- POINT (°C)
FLUOROCARBON	2,3,4,5-TETRAFLUOROACETOPHENONE			IR, LCLAS					OXID, BASE		83.0	1.403	66
	2,4,5-BIS(4-FLUOROPHENYL)PENTAFLUOROPHENYL ETHER			COMBUSTIBLE					OXID, BASES		130.0	1.476	65
	3,3',4,4',5,5'-HEXAFLUORO-1,1'-BI(4-FLUOROPHENYL) ETHER			FLAM, IRR		0.5	0.5		OXIDIZERS		59.0	1.418	-17
	3,3',4,4',5,5'-HEXAFLUORO-1,1'-BI(4-FLUOROPHENYL) ETHER			FLAM, IRR					OXIDIZERS		273.0	1.520	19
	3,3',4,4',5,5'-HEXAFLUORO-1,1'-BI(4-FLUOROPHENYL) ETHER			COMB, IRR					OXIDIZERS		176.0	1.637	51
	2,2,3,3,4,4,5,5'-OCTAFLUORO-1,1'-BI(4-FLUOROPHENYL) ETHER			SOLID					OXIDIZERS				NONE
	FLUORINERT-104			11.00	NO KNOWN	14	29		STABLE	0.8	101.0	1.770	229
	FLUORINERT-40			7.00	NO KNOWN	15	1		STABLE	2.2	155.0	1.870	270
	FLUORINERT-40			7.00	NO KNOWN	15	1.3		STABLE	2.8	174.0	1.960	284
	FLUORINERT-70			8.00	NO KNOWN	16	-0.1		STABLE	14	215.0	1.930	335
FLUOROCARBON	FLUORINERT-71		9.00	NO KNOWN	18	-0.02		STABLE	46.0	253.0	1.900	373	
	FLUORINERT-72		10.00	NO KNOWN	12	233.0	233.0	STABLE	0.4	56.0	1.680	178	
	FLUORINERT-75		11.00	NO KNOWN	15	31		STABLE	0.9	102.0	1.770	227	
	FLUORINERT-77		13.00	NO KNOWN	15	42		STABLE	0.8	87.0	1.780	228	
	FLUORINERT-84		11.00	NO KNOWN	13	79		STABLE	0.55	80.0	1.730	205	
	PERFLUOROPENTANE				IR, IRRITANT				STABLE		82.0	1.745	NONE
	PERFLUOROPENTANE				COMBUSTIBLE				OXIDIZERS		137.0	1.950	59
	PERFLUOROPENTANE				IRITANT				OXIDIZERS		58.3	1.669	NONE
	12-DIMETHYLBIPHENYLENE			INSOL				FATS, OILS	265.0	1.013	105		
	KETONES	2,4-DIMETHYLCYCLOPENTANONE			COMB, IRR					OXID, BASE		152.0	0.895
2,4-DI(4-FLUOROPHENYL)PENTAFLUOROPHENYL ETHER				COMB, IRR					OXID, BASES		81.0	1.234	66
2-CYCLOHEPTANONE									OXID, BASE		90.0	0.988	68
2-DECANONE									OXID, BASE		211.0	0.825	71
2-METHYL-2-DECANONE									OXID, BASE		122.0	1.057	109
2-NONANONE									OXID, BASE		158.0	0.816	43
2-OCTANONE									OXID, BASES		192.0	0.832	64
2-PENTANONE									OXID, BASES		173.0	0.819	82
2-HEPTANONE						27	3		STABLE		150.0	0.807	12
3-HEPTANONE						<1	5.9		OXID, BASE		231.0	0.825	86
KETONES	3-HEXANONE					4.74	3.84		OXID, BASES		146.0	0.818	41
	3-METHYL-2-CYCLOHEXYL-1-ONE								OXID, BASES		123.0	0.815	34
	3-METHYL-2-CYCLOPENTANONE								OXID, BASES		199.0	0.971	69
	3-NONANONE								OXID, BASE		187.0	0.821	67
	3-HEXANONE								OXID, BASE		85.0	0.848	81
	3-OCTANONE								OXID, BASES		167.0	0.822	46
	3-PENTANONE					28.1	3		OXID, BASES		102.0	0.816	12
	4-HEPTANONE					5.2	3.59		OXID, BASES		145.0	0.817	49
	4-METHYL-2-CYCLOHEXYL-1-ONE								OXID, BASES		169.0	0.814	40
	5-METHYL-2-HEXANONE								OXID, BASES		145.0	0.808	41
KETONES	5-METHYL-2-HEXANONE					4.5	3.94		OXID, BASES		148.0	0.855	42
	6-METHYL-2-HEPTANONE								OXID, BASES		173.0	0.855	50
	5-UNDECANONE								OXID, BASES		228.0	0.831	89
	ACETONE					1.84	2		OXID, BASES		56.0	0.781	-17
	ACETONYL ACETONE								OXID, BASES		181.0	0.973	78
	BENZYL ACETONE								OXID, BASES		235.0	0.989	98
	CYCLOBUTANONE								OXID, BASES		86.0	0.938	9
	CYCLOBUTYL PHENYL KETONE								OXID, BASES		116.3	1.059	109
	CYCLODECANONE								OXID, BASES		179.0	0.871	82
	CYCLO-2-HEPTANONE								OXID, BASES		179.0	0.851	55
KETONES	CYCLONONANONE								OXID, BASES		97.0	0.856	65
									OXID, BASES				65

## PROPERTIES

CLASSIFICATION	COMPOUND	INDUSTRIAL USE	WATER SOLUBILITIES (GR / 100 GR WATER)	TOXICOLOGY / HAZARDS	SURFACE TENSION	VAPOR PRESSURE (mm)	VAPOR DENSITY	SOLVENCY	REACTIVITY	VISCOSITY (cP)	BOILING POINT (°C)	DENSITY @ 20 °C	FLASH-POINT (°C)
	CYCLOPROPYL 4-FLUOROPHENYL KETONE								OXIDIZES		120.0	1.144	59
	CYCLOPROPYL PHENYL KETONE						5		OXIDIZES		123.0	1.059	52
	HEXAFLUOROACETYL KETONE								OXIDIZES		71.0	1.470	NONE
	METHYL ISOBUTYL KETONE		18	HARMFUL		15	3.5		STABLE		117.0	0.801	13
	OC ANTHRONE			HAZARDOUS					OXIDIZES		285.0	0.938	109
NAPHTHENES	CYCLOHEXANE			HARMFUL		77	2.9		OXIDIZES		81.0	0.779	-77
CYCLOALKANES	CYCLOPENTANE			HARMFUL		21.4	2		OXIDIZES		50.0	0.751	1
	METHYLCYCLOHEXANE			FLAMMABLE		37	3.4		OXIDIZES		131.0	0.770	-3
	1,2-DIMETHYLCYCLOHEXANE			FLAMMABLE		31	3.5		OXIDIZES		124.0	0.728	15
TERPENES	CITRONELLO			HARMFUL		0.02	5.4		OXIDIZES		222.0	0.831	98
	ISOPRENE			TOXIC		33	2.35		V REACTIVE		34.0	0.681	18
	TERPENE		INSOL	TOXIC		0.8	4.7		AR		173.0	0.837	46
MISCELLANEOUS	WATER		INF	HAZARDOUS		23.7					160.0	1.000	374
	PERCHLOROETHYLENE			TOXIC		13	5.83		PASS		121.0	1.523	NONE



## EXHIBIT H



Edit

Type of Report: WIN Summary  
Title: HOPE, 1996 - 1998  
Authors: Database  
Location: Research & Engineering  
Product Category: Project Data  
Technical Category: Notes Databases  
Related Materials: Contains 137 documents from 1996-1998  
Report:

Project Number:  
Report Date: 03/01/1996

This db was for non-aqueous wash system development. Project leaders were Dan Conrad and Mark Kovich. Other team members included Earl Meister and Tre Wright.

Topics included chemicals tested, Cleaning potential of Triton GR-7M surfactant, Final Chemical Report for Project Athena, Experimental Results and Analysis of Displacement Fluids for Drying, Petroferm chemicals, and Oxiclear Gas Purifiers and Filters.

Team members can open the database with this link - [Category View](#). It will ask you to authenticate with your userid and http/Domino password (RERP). If you do not have access to this database and would like more information, contact one of the names listed above or Gloria Begor at the Technical Information Center. From the Notes client this db can be found on ADCNS1 in the directory/folder 'projects'.

- Whirlpool Confidential -

Entered on 02/10/2003 by Sally F Pollock Benson Harbor US/E Whirlpool  
Not yet edited by anyone other than the Author

## Project HOPE - Discussion Topic

**C2C stage:** Ideation**Project Number:****Document Author:** Daniel C Conrad**Date Composed:** 03/01/1996**Subject\*:** G.N.A.W. the magic "FuFu" dust**Category\*:** Presentations & Communications**Sub-Category:** Intellectual Property **If other, indicate here:****Text of Topic:**

Presentation put together by Steve Krefman on the issues related to "Fu Fu" in the arena of General Non Aqueous Wash (GNAW)



FUFU PPT

**File Attachments** (after viewing, use the **Back** arrow to return to this screen)

**Attachment Types:**

Entered by Daniel C Conrad 01-Mar-96 at 05:20 PM

## Project HOPE - Discussion Topic

C2C stage: Ideation

Project Number:

Document Author: Daniel C Conrad

Date Composed: 03/07/1996

Subject\*: FuFu Brainstorming Notes

Category\*: Ideation History

Sub-Category: Brainstorm Notes

If other, indicate here:

Text of Topic: Project HOPE initiation brainstorming notes by Steve Krefman



FUFU.DOC

File Attachments (after viewing, use the Back arrow to return to this screen)

Attachment Types:

Entered by Daniel C. Conrad 07-Mar-96 at 04:19 PM

## Project HOPE - Discussion Topic

C2C stage: Ideation

Project Number:

Document Author: Mark B. Kovich

Date Composed: 05/06/1996

Subject\*: Updated Non-Aqueous Matrix

Category\*: Environmental Scan

Sub-Category: Chemistry If other, indicate here:

Text of Topic: This is the updated version of the matrix. I will continue to update this as more information becomes available.



MATRIX.XLS

File Attachments (after viewing, use the Back arrow to return to this screen)

Attachment Types: Excel

Entered by Mark B. Kovich 06-May-96 at 09:55 AM

## Project HOPE - Discussion Topic

C2C stage: Ideation

Project Number:

Document Author: Catherine Tong

Date Composed: 09/04/1996

Subject\*: Detergent Properties of Hydrocarbons, Fluorocarbons, and Microemulsions

Category\*: Test Results

Sub-Category: Testing If other, indicate here:

Text of Topic: This is report 517720-005.



TONG.DOC



RPT005.XLS

**File Attachments** (after viewing, use the Back arrow to return to this screen)

**Attachment Types:** Word, Excel

Entered by Catherine Tong 04-Sep-96 at 10:13 AM

Report 517720-005

## EXHIBIT I



49022-0026

CORPORATE TECHNOLOGY DEVELOPMENT  
LAUNDRY APPLICATIONS  
The Elisha Gray II  
Research and Engineering Center  
750 Monte Road  
Benton Harbor, Michigan

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**TITLE:** Detersive Properties of Hydrocarbons, Fluorocarbons, and  
Microemulsions

**DATE:** 15 August, 1996

**PROJECT #:** 517720-005

**BY:** Catherine Tong  
Mark Kovich  
Tremitchell Wright

---

### DISTRIBUTION LIST:

Dr. Daniel Conrad  
Steve Krefman  
Technical Information Center

Report 517720-005

### Summary

The purpose of this investigation is to discover a water replacement as well as a cleaning agent that can be used in a non-aqueous wash process. Table 1 displays a list of the variety of fluids from different chemical families that were tested. These include alcohols, carboxylic acids, esters, fluorocarbons, ketones, terpenes, and microemulsions. The fluids were evaluated based on the wash performance on selected swatches. A matrix of the fluids and the observations from each test can be found in Table 2. Figures 2-4 show the wash performance of the various fluids. The numerical results of the tests can be found in Tables 3-4.

From the observations and testing generated so far, the fluorinated compounds are likely candidates for a water replacement. However, the compounds have demonstrated inferior deterative performance to Tide. Neat solutions which are ones that are only composed of one chemical compound are not necessarily the way to go. Because of the complexity of different types of stains and soils, a cosolvent or multicomponent mixture containing an inert working fluid will most likely be needed in the non-aqueous cleaning process to achieve all fabric care.

### Background

Environmental and health concerns have increased regarding chlorinated solvents such as perchloroethylene, trichloroethylene, methylene chloride, and 1,1,1-trichloroethane. In 1987, the *Montreal Protocol on Substances That Deplete the Ozone Layer* was signed to protect the stratospheric ozone layer. The treaty specifies that the production and consumption of chlorofluorocarbons, halons, and carbon tetrachloride are to be phased out by the year 2000. Scientific evidence suggests that these compounds deplete the ozone layer that shields the planet from damaging UV-B radiation. Therefore, new non-ozone depleting, nontoxic, and low global warming potential cleaning agents that work as well as the chlorinated solvents if not better have been the focus of research in the cleaning industry.

In the dry cleaning industry, perchloroethylene is used as the preferred solvent for delicate fabrics. Research has been centered on finding better recovery systems for this fluid so that it doesn't leak into the atmosphere as well as searching for alternative chemistries that can be used in the dry cleaning system. For example, prototype CO<sub>2</sub> dry-cleaning processes have been documented. New solvents that are discovered for washing garments could also be used in wash systems for the home.

The ultimate goal of the non-aqueous wash project is the "perfect care of all fabrics requiring no time and effort." Therefore, many different types of fabrics were used in the testing of the deterative properties of the fluids. The swatches used include AS-9 Cotton, PC-9 Blend, Clay, Wool, Silk, Nylon, and Rayon. Most of the testing was done on the AS-9 Cotton since only a limited amount of certain fluids was available. AS-9

Report 517720-005

is a cotton swatch that is soiled with pigment oil. PC-9 is a polyester/cotton blend that is also soiled with pigment oil. The Clay is a cotton swatch that is soiled with a bandy black research clay. The Wool, Silk, Nylon, and Rayon are swatches that are soiled with dust sebum. Testing the deterative properties of the fluids on these various swatches will help evaluate the vision of the non-aqueous wash project. However, the remaining portion of the report will focus mostly on differences seen using AS-9.

The purpose of this investigation is to identify chemistries that can be used in the non-aqueous wash process for home use. The non-aqueous wash process is washing without water. Water can cause swelling of the fibers within the fabric and damage the garment. The discovery of a water replacement as well as a cleaning agent is the focus of the investigation. A variety of fluids from different chemical families were tested. These include alcohols, carboxylic acids, esters, fluorocarbons, ketones, terpenes, and microemulsions. These fluids were picked based on safety reasons as well as on information obtained from scientific literature. Most of the fluids have a relatively high flash point which is the lowest temperature at which vapors above a volatile combustible substance ignite in air when exposed to flame. Some of the fluids like the hydrofluorocarbons have already been used in the metal cleaning industry. Compounds with a low vapor pressure, low viscosity, or a low surface tension were also considered. Benefits of these characteristics are as follow; a low vapor pressure fluid dries quickly. A low viscosity and a low surface tension fluid can speed up the wetting of the fabric during the wash process and may promote particulate soil removal. A list of the various compounds along with the chemical families to which they belong is in Table 1.

#### Test Setup

In this test, there were basically two methods used to find the deterative properties of the fluids. The first test involved using a tergotometer which models a washing machine. The tergotometer has a vertical axis that twists clockwise and counterclockwise and was set to agitate at 100 spins per minute. The containers of the tergotometer were sealed by screws around the perimeter of the cover, and reflux condensers were placed in a hole on the cover to condense any vapors from the fluids. Five swatches were agitated in one liter of fluid in the machine for five minutes.

The second test was done in beakers. Some of the fluids could only be ordered in quantities smaller than the volume of the tergotometer. Since this was the case, some fluids were tested in beakers with swatches washed one at a time under a fume hood. The swatches were stirred in the beakers in a way similar to the rotation of the tergotometer axis for five minutes. The detailed procedure of the test method is located in Figure 1.

#### Results



Report 517720-005

All results are reported in Delta Y values and are compared to the baseline value obtained from testing with Tide. As a rule of thumb, a Delta Y value of three or greater can usually be visible. Besides washability, other observations include drying times, odors, and fabric damage as noted. A matrix of the fluids and the observations from each test can be found in Table 2. The numerical results of the tests can be found in Tables 3-4.

#### Washability

Fluorinert was the only compound besides Tide that was tested with all seven types of swatches. It is a fluorinated compound produced by 3M. Fluorinert performs inferior to Tide. Figure 2 compares these two fluids in their washing capabilities.

Most of the testing was done on the AS-9 Cotton swatches since most fluids were not available in substantial amounts. Figure 3 shows the Delta Y values of the tergotometer test with the fluids grouped according to their respective chemical families. With this method, the fluids that performed the closest to Tide were the Inverts. Inverts are microemulsions developed by Dow that are 50% water and 50% solvents and surfactants. All other fluids tested with this method did not perform up to Tide's standards. The alcohol, ether, ketones, one of the carboxylic acids, and one of the fluorinated compounds performed similar in their Delta Y values to each other. Triton X-100 caused a negative Delta Y value. This might be due to residues or splotches left on the swatch after a significantly long drying period.

Due to insufficient volumes of fluid, a beaker test was used to evaluate AS-9 swatches. Of the fluids tested in this manner, only Tarksol, an aqueous degreaser from Terpene Technologies, with a water rinse performed similar to Tide. All other fluids tested performed inferior to Tide. The terpenes had varying ability to clean fabrics. The fluorinated compounds performed inferior to the esters, terpenes, and one of the carboxylic acids. The other carboxylic acid, diethyl dodecanedioate, resulted in a negative Delta Y value. Again, this might be due to residues or splotches left on the swatch. Perhaps a solvent rinse or increased temperatures would speed up the drying process and not leave residues on the swatches. The results are shown in Figure 4.

#### Drying Times

Drying times are also an important observation from these tests. The swatches were mostly hung dry in the fume hood with the exception of the Tide and Fluorinert which were laid flat to dry. Quick drying times can mean faster laundry cycle times for the consumer as well as less energy used. The ability to dry quickly can somewhat be attributed to a physical property of the fluid called vapor pressure. A fluid with a low vapor pressure has the ability to evaporate quickly and efficiently, causing the fabric to dry almost immediately after the wash. The compounds with this property are the fluorocarbons. Some other fluids

Report 517720-005

like 2-pentanone and  $\alpha$ -terpinene dry relatively quickly as well when compared to water. The remaining fluids require drying times from two hours to two days. Figure 5 shows a spectrum of these drying times.

#### Fabric Damage

Because any damage to the garment caused by washing with solvents would not be beneficial to the consumer, a preliminary fabric damage assessment is necessary. Indications of fabric damage include fraying at the edges of the swatch and no retention of the texture of the fabric. With respect to the swatches washed in Fluorinert, there doesn't appear to be any fabric damage, not even to wool. Tide caused substantial fraying of the wool swatches. As to the AS-9 cotton swatches, none of them seem to be damaged from a visual inspection.

#### Odors

Many of the fluids have different odors associated with them. The various smells might have to be masked by perfumes or other agents during the wash process. One group without any odors are the fluorocarbons. Most of the fluids emit bad odors, but some of them exhibit a fruity smell. These include the terpenes such as the Inverts and the Invert Detergents, which are produced from natural products like citrus and pine oils.

#### Conclusion

From the observations and testing generated so far, the fluorinated compounds are likely candidates for a water replacement. They can be considered good inert working fluids which are ones that show little or no detergent properties and do not cause swelling of the fibers in the fabric. They are non-reactive with any chemicals or with the garment. With the limited number of tests performed, the compounds have demonstrated inferior detergent performance to Tide. Neat solutions which are ones that are only composed of one chemical compound are not necessarily the way to go. Because of the complexity of different types of stains and soils, a cosolvent or multicomponent mixture containing an inert working fluid will most likely be needed in the non-aqueous cleaning process to achieve all fabric care.

There are many other experiments that are needed to fully evaluate a fluid for use in the non-aqueous wash process. Some further testing such as surface tension, dimensional stability of the swatch, and the solvency of the fluid can provide more insight into the potential for a home non-aqueous wash system.

Figure 1

#### Test Methods

Report 517720-005

*Deterstive Evaluation:* Two types of tests were used in determining the deterstive properties of the fluids. Test I was done in the tergotometer while Test II was done in beakers. The swatches used include AS-9 Cotton, PC-9 Blend, Clay, Wool, Silk, Nylon, Rayon, and CS-4 Oily.

Tergotometer Test (for Tide)

1. Read 5 swatches of one type on the colorimeter.
2. Add 1L of water at a given temperature and 4 ml of Tide into a tergotometer container.
3. Place the 5 swatches into the container.
4. Agitate for 5 minutes at 100 spm.
5. Rinse the swatches in 70°F water for 5 minutes.
6. Remove the swatches and air dry.
7. Read swatches on the colorimeter.
8. Repeat the procedure 2 more times at the given temperature.
9. Repeat the procedure at three temperatures: 70°F, 100°F, and 140°F

Tergotometer Test (for other non-aqueous fluids)

1. Read 5 swatches of one type on the colorimeter.
2. Add 1L of fluid into a tergotometer container.
3. Place the 5 swatches into the container.
4. Agitate for 5 minutes at 100 spm and at 70°F.
5. Remove the swatches and hang dry in the fume hood.
6. Read swatches on the colorimeter.
7. Repeat the procedure 2 more times if enough fluid.

Beaker Test

1. Read 5 swatches of one type on the colorimeter.
2. Add 50 ml of fluid into a beaker.
3. Place 1 swatch into the beaker.
4. Stir with a stirring rod for 5 minutes.
5. Remove the swatch and hang dry in the fume hood.
6. Repeat the procedure 4 more times.
7. Read the swatches on the colorimeter.